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10/765,314	01/27/2004	Gurtej S. Sandhu	MIO 0092 NA	9407

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DINSMORE & SHOHL LLP
ONE DAYTON CENTRE, ONE SOUTH MAIN STREET
SUITE 1300
DAYTON, OH 45402-2023

EXAMINER	
SMITH, FRANCIS P	
ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/765,314	SANDHU, GURTEJ S.	
	Examiner	Art Unit	
	FRANCIS P. SMITH	4151	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *See Continuation Sheet* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-8,11,12,18,19,21,24,25,27,33,38,39,41,42,45-47,49,53, and 59* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims pending in the application are 1,2,5-8,11,12,18,19,21,24,25,27,33,38,39,41,42,45-47,49,53 and 59.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :4/19/2004; 11/14/2005; 5/1/2006.

DETAILED ACTION

Applicant's amendment dated October 26, 2007 is acknowledged. Claims 3,4,9,10,13-17,20,22,23,26,28-32,34,35,37,39,40,43,44,48,50,51,52,54-58, and 60-78 are canceled. Claims 1,2,5-8,11,12,18,19,21,24,25,27,33,38,39,41,42,45-47,49,53, and 59 are currently pending and examined on the merits.

Claim Objections

1. Claims 5, 24, and 48 are objected to because of the following informalities: The claims are dependent on canceled claims. Appropriate correction is required. For examination it is assumed that claim 5 depends on claim 1, claim 24 depends on claim 21 and claim 48 depends on claim 41.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 5, 24, and 48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 5 recites the limitation "said monolayer of said material" in lines 1 and 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

5. Claim 24 recites the limitation "said dispenser unit, and said beam" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim. Claim 48 recites the limitation "...relative motion between the substrate, said beam, and said dispenser unit" in lines 1 and 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.,* 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 1, 2,6-8 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elliot et al. (US 5,669,979) in view of Sakuma et al.(US 5,270,247), DiMeo Jr. et al. (US 5,972,430) and further in view of Tseng et al. (EP 704551).

Elliot teaches a photoreactive surface process that includes selecting the appropriate processing parameters (i.e. reaction parameters) (col. 21, lines 55-61).

Also, the reaction chamber contains mechanical equipment to support the substrate and move it into and out of the chamber (i.e. loading the workpiece into a reaction chamber) (col. 20, lines 62-67). A mechanical pump pumps on the reaction chamber until a desired pressure is achieved (col. 22, lines 1-2). A stage translates the chuck and substrate at a constant rate across the reaction chamber as determined by the controller (col. 22, lines 2-5). Also, a laser beam is scanned across the surface while a reactant gas (e.g. input gas) is introduced close to the intersection of the beam and the substrate, which is analogous to delivering a beam of electromagnetic radiation to produce a high flux of point of use generated reactive gas species that reacts with the surface"(col. 3, lines 50-55). Elliott, however, is silent with regard to flowing simultaneously precursor, purge, and input gases into the chamber and evacuating the purge gas/residuals in the vicinity of the purge gas.

Sakuma discloses a process for growing a crystalline compound semiconductor, in which a control of an atomic layer level is possible and an excellent crystalline compound semiconductor can be grown. Specifically, first source, purge, and second source gases are introduced into the reaction chamber, whereby the purge gas is used to prevent the mixing of the first and second gas sources (analogous to precursor and input gases) (col. 2, lines 47-60; col. 3, lines 34-39). However, Sakuma does not disclose flowing said gases into the chamber simultaneously.

DiMeo Jr. teaches a chemical vapor deposition method for forming a multi-component oxide layer wherein the first and second precursor reactant sources (i.e. input and process gases) are introduced into the chamber simultaneously (col. 4, lines

43-49).

Tseng discloses a method of processing a substrate in a vacuum processing chamber where a purge gas is introduced into a chamber simultaneously with the process gas (col. 9, lines 43-48).

Therefore, it would be obvious to one skilled in the art at the time of the invention to adapt Elliott's method by incorporating DiMeo and Tseng's simultaneous introduction of Sakuma's first, second and purge gases (i.e. precursor, input and purge gases), especially when the reactive species contact/interact with the substrate separately, in order to reduce processing steps to save time and energy.

As per claim 2, Elliott teaches the use of a Diluent gas (analogous to transmission gas) in order to insure that an adequate beam intensity reaches the substrate (col. 16, lines 32-35).

For claim 6, Elliott teaches purging the chamber in a conventional manner with nitrogen, which is analogous to purging completely said chamber (col. 22, lines 49-53). Furthermore, after completion of the process, the work piece is removed from said reaction chamber (col. 22, lines 38-46).

For claim 7, Elliott discloses directing a laser beam through a lens (i.e. window) of the said reaction chamber (col. 21, lines 25-31).

Regarding claim 8, Elliott describes causing relative motion between the surface of the substrate (i.e. workpiece) and the laser beam (col. 2, lines 58-61).

For claim 11, Elliott disclose the use of semiconductor wafers (i.e. a semiconductive substrate) (col. 8, lines 53-56).

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Elliot et al. (US 5,669,979) in view of Sakuma et al.(US 5,270,247), DiMeo Jr. et al. (US 5,972,430) and Tseng et al. (EP 704551) as applied to claim 1 above, and further in view of Vaught (5,023,424).

Elliott, as modified by Sakuma, DiMeo Jr., and Tseng, does not teach checking the workpiece for completeness.

Vaught teaches a method for using laser induced shock waves to dislodge particles from a wafer surface. Included in the method is a particle detector that locates

the existence of particles on a substrate's surface, which would be capable of checking for the formation of said monolayer of said material on the surface of the workpiece for completeness (col. 2, lines 49-51). Therefore, it would be obvious to one skilled in the art at the time of the invention to include Vaught's particle detector in Elliott's method, as modified by Sakuma, DiMeo Jr., and Tseng, in order to save time and processing materials by precisely determining the existence and location of a monolayer.

10. Claims 12 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakuma et al. (5,270,247) in view of DiMeo Jr. et al. (US 5,972,430) and further in view of Elliott et al. (US 5,669,979).

Sakuma teaches a process of growing a crystalline compound semiconductor such that the control of the atomic layer level is possible. Specifically, a III-group source gas is exposed to the substrate, which is analogous to exposing the surface to a precursor gas (col. 5, lines 6-9). A second V-group source gas is introduced that results in a III-V monolayer, which is analogous to reacting said generated reactive gas species with said surface reactant to form at least a monolayer on the surface of the substrate (col. 2, lines 57-59; col. 5, lines 23-27). The III and V group gases may be separated by using a hydrogen purge gas (col. 5, lines 28-38). Sakuma does not teach providing an input gas simultaneously with a precursor gas or directing a beam of electromagnetic radiation to produce a high flux of reactive gas species.

DiMeo Jr. teaches a chemical vapor deposition method for forming a multi-component oxide layer wherein the first and second precursor reactant sources (i.e.

input and process gases) are introduced into the chamber simultaneously, which is analogous to introducing an input gas simultaneously with a precursor gas (col. 4, lines 43-49).

Elliott et al. teaches a photoreactive surface processing where a laser beam is shaped and delivered via an optical system through a lens/window while a stream of input gas is blown across the region to intersect the said beam (i.e. directing a beam of electromagnetic radiation into said input gas to produce a high flux of generated reactive gas species) (col. 20, lines 31-51).

Therefore, it would be obvious to one skilled in the art at the time of the invention to adapt Sakuma's atomic layer deposition process by incorporating DiMeo Jr.'s simultaneous introduction of the process gases and Elliott's laser beam in order to obtain a time efficient method of forming a monolayer by reducing the number of process steps and enhancing the reaction of the process gases with electromagnetic radiation.

For claim 18, Sakuma teaches a separation between III and V source gases by supplying a hydrogen gas for purging between the steps of supplying the III-group and V-group gases (col. 5, lines 28-31).

11. Claims 19,21,24,25,27,33,38, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakuma et al. (5,270,247), DiMeo Jr. et al. (US 5,972,430), and Elliott et al. (US 5,669,979). as applied to claim 12 above, and further in view of Vaught (US 5,023,424).

Sakuma, as modified by DiMeo Jr., and Elliott, does not teach generating a reactive species at a specific distance above the surface of the substrate.

Vaught teaches a method that utilizes a focused laser beam to produce shock waves at points above the surface. The beam comes to a focus at a point, or an extremely small volume of high flux density, where the shock wave is generated close to the surface, which is analogous to generating a reactive species above the surface of the substrate. The distance of the focal point may be up to 4 millimeters (col. 5, lines 11-13). Therefore, it would be obvious to one skilled in the art at the time of the invention to adapt the method of Sakuma as modified by DiMeo Jr., and Elliott by incorporating Vaught's laser beam focal point above the surface of the substrate in order produce a shock wave close enough to the surface to produce reactive species for monolayer deposition.

For claim 21, Sakuma teaches a process of growing a crystalline compound semiconductor such that the control of the atomic layer level is possible. Specifically, a III-group source gas is exposed to the substrate, which is analogous to exposing the surface to a precursor gas to form a surface reactant (col. 5, lines 6-9). A second V-group source gas is introduced that results in a III-V monolayer, which is analogous to reacting said generated reactive gas species with said surface reactant to form at least a monolayer on the surface of the substrate (col. 2, lines 57-59; col. 5, lines 23-27). The III and V group gases may be separated by using a hydrogen purge gas (col. 5, lines 28-38). Sakuma does not teach providing an input gas simultaneously with a precursor gas, directing a beam of electromagnetic radiation to produce a high flux of

reactive gas species at a finite distance, or providing the substrate in a chamber containing a transmission gas.

DiMeo Jr. teaches a chemical vapor deposition method for forming a multi-component oxide layer wherein the first and second precursor reactant sources (i.e. input and process gases) are introduced into the chamber simultaneously, which is analogous to introducing an input gas simultaneously with a precursor gas (col. 4, lines 43-49).

Elliott et al. teaches a photoreactive surface processing where a laser beam is shaped and delivered via an optical system through a lens/window while a stream of input gas is blown across the region to intersect the said beam (i.e. directing a beam of electromagnetic radiation into said input gas to produce a high flux of generated reactive gas species) (col. 20, lines 31-51). Furthermore, Elliott teaches the use of a Diluent gas (analogous to transmission gas) in order to insure that an adequate beam intensity and reactive species reaches the substrate, (i.e. providing a substrate to a reaction chamber containing a transmission gas) (col. 16, lines 32-35).

Vaught teaches a method that utilizes a focused laser beam to produce shock waves at points above the surface. The beam comes into focus at a point, or an extremely small volume of high flux density, where the shock wave is generated close to the surface, which is analogous to generating a reactive species above the surface of the substrate. The distance of the focal point may be up to 4 millimeters (i.e. a finite distance) (col. 5, lines 11-13).

Therefore, it would be obvious to one skilled in the art at the time of the invention

to adapt Sakuma's atomic layer deposition process by incorporating DiMeo Jr.'s simultaneous introduction of the process gases and Elliott's laser beam at Vaught's finite distance to obtain a time efficient method of forming a monolayer by reducing the number of process steps and enhancing the reaction of the process gases with electromagnetic radiation.

For claims 24 and 27, Elliott discloses that relative motion may be caused between the surface and the beam to cause the beam to sweep over the surface of the substrate (col. 2, lines58-61). Furthermore, the substrate is translated at a constant rate across the reaction chamber from a rear to a forward end. The substrate reaches a reaction zone, at which time the controller actuates a gas valve and allows the release of input gas through a nozzle (i.e. dispenser unit) (col. 22, lines 1-14).

Regarding claim 25, the laser beam is shaped and delivered via an optical system that includes a lens (i.e. window) constructed of fused silica and permits visual inspection of the reaction chamber during processing (col. 20, lines 31-40).

For claim 33, Elliott teaches optimization of the characteristics of the energy delivered (i.e. energy characteristics of the beam) with consideration of the energy absorption characteristics of the input gas (e.g. match absorption characteristics of said input gas) in order to create a high flux of reactive gas species (col. 7, lines 54-64).

As per claim 38, Sakuma teaches supplying a first source gas that enables a growth of a mono atomic layer on a crystalline substrate, which is analogous to

providing a gas layer flown over the substrate with a thickness large enough to accommodate the finite distance (col. 5, lines 6-9).

As for claim 39, Vaught discloses that a beam comes to focus at a point, or an extremely small volume of high flux density, where the shock wave is generated close to the surface, which is analogous to generating a reactive species above the surface of the substrate. The distance of the focal point may be up to 4 millimeters (i.e. a finite distance) (col. 5, lines 11-13).

12. Claims 41,42,45-47,49, and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakuma et al (US 5,270,247), Elliott et al. (US 5,669,979), Vaught (US 5,023,424), DiMeo Jr. et al (US 5,972,430), and further in view of Tseng et al. (EP 704551).

For claim 41, Sakuma teaches a process of growing a crystalline compound semiconductor such that control of the atomic layer level is possible. A crystalline substrate is arranged in a reaction tube, which is analogous to loading the substrate into the reaction chamber (col. 6, lines 1-4). A III-group source gas is exposed to the substrate, which is analogous to exposing the surface to a precursor gas to form a surface reactant (col. 5, lines 6-9). A second V-group source gas is introduced that results in a III-V monolayer, which is analogous to reacting said generated reactive gas species with said surface reactant to form at least a monolayer on the surface of the substrate (col. 2, lines 57-59; col. 5, lines 23-27). The III and V group gases may be separated by using a hydrogen purge gas, which is analogous to preventing the mixing

of the precursor and input gases by evacuating the purge gas and any gases/residuals in vicinity of the purge gas (col. 5, lines 28-38). Sakuma, however, is silent with regard to pumping the reaction chamber to a specified pressure, flowing precursor, purge, and input gases simultaneously, and delivering a beam of electromagnetic radiation spaced at a finite distance.

Elliot teaches a photoreactive surface process that includes a mechanical pump and pumps on the reaction chamber until a desired pressure is achieved (col. 22, lines 1-2).

Vaught teaches a method that utilizes a focused laser beam to produce shock waves at points above the surface. The beam comes into focus at a point, or an extremely small volume of high flux density, where the shock wave is generated close to the surface, which is analogous to generating a reactive species above the surface of the substrate. The distance of the focal point may be up to 4 millimeters (i.e. a finite distance) (col. 5, lines 11-13).

DiMeo Jr. teaches a chemical vapor deposition method for forming a multi-component oxide layer wherein the first and second precursor reactant sources (i.e. input and process gases) are introduced into the chamber simultaneously (col. 4, lines 43-49). However, DiMeo does not teach introducing a purge gas simultaneously with said reactant gases.

Tseng discloses a method of processing a substrate in a vacuum processing chamber where a purge gas is introduced into a chamber simultaneously with the process gas (col. 9, lines 43-48).

Therefore, it would be obvious to one skilled in the art at the time of the invention to adapt Sakuma's method by incorporating Elliott's pre-selected pressure, Vaught's laser beam, and DiMeo and Tseng's simultaneous introduction of process gases (i.e. precursor, input and purge gases) in order to create an ambient atmosphere for monolayer deposition and to reduce processing steps to save time and energy.

For claim 42, Elliott teaches the use of a Diluent gas (analogous to transmission gas) in order to insure that an adequate beam intensity reaches the substrate (col. 16, lines 32-35).

Regarding claim 45, Vaught teaches a method for using laser induced shock waves to dislodge particles from a wafer surface. Included in the method is a particle detector that locates the existence of particles on a substrate's surface, which would be capable of checking for the formation of said monolayer of said material on the surface of the workpiece for completeness (col. 2, lines 49-51).

As per claim 46, Elliott discloses directing a laser beam through a lens (i.e. window) of the said reaction chamber (col. 21, lines 25-31).

Addressing claim 47, Elliott describes causing relative motion between the surface of the substrate (i.e. workpiece) and the laser beam (col. 2, lines 58-61).

As for claim 49, Elliott discloses that relative motion may be caused between the surface and the beam to cause the beam to sweep over the surface of the substrate (col. 2, lines58-61). Furthermore, the substrate is translated at a constant rate across the reaction chamber from a rear to a forward end. The substrate reaches a reaction

zone, at which time the controller actuates a gas valve and allows the release of input gas through a nozzle (i.e. dispenser unit) (col. 22, lines 1-14).

For claims 53, Elliott teaches optimization of the characteristics of the energy delivered (i.e. energy characteristics of the beam) with consideration of the energy absorption characteristics of the input gas (e.g. match absorption characteristics of said input gas) in order to create a high flux of reactive gas species (col. 7, lines 54-64).

13. Claims 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakuma et al (US 5,270,247), Elliott et al. (US 5,669,979), DiMeo Jr. et al (US 5,972,430), and further in view of Omstead et al. (US 6,544,341).

Regarding claim 59, Sakuma teaches a process of growing a crystalline compound semiconductor such that the control of the atomic layer level is possible. A III-group source gas is exposed to the substrate via a gas inlet, which is analogous to exposing the surface to a precursor gas from a dispensing unit to form a surface reactant (col. 5, lines 6-9; col. 6, lines 14-16). A second V-group source gas is introduced that results in a III-V monolayer, which is analogous to reacting said generated reactive gas species with said surface reactant to form at least a monolayer on the surface of the substrate (col. 2, lines 57-59; col. 5, lines 23-27). The III and V group gases may be separated by using a hydrogen purge gas, which is analogous to preventing the mixing of the precursor and input gases by evacuating the purge gas and any gases/residuals in vicinity of the purge gas (col. 5, lines 28-38). Sakuma, however, is silent regarding causing relative motion between substrate, dispenser, and substrate

surface, providing the input and precursor gases from a dispensing unit above the substrate simultaneously, or generating a high flux of reactive species with a beam of electromagnetic radiation.

Elliott discloses that relative motion may be caused between the surface and the beam to cause the beam to sweep over the surface of the substrate (col. 2, lines58-61). Furthermore, the substrate is translated at a constant rate across the reaction chamber from a rear to a forward end. The substrate reaches a reaction zone, at which time the controller actuates a gas valve and allows the release of input gas through a nozzle (i.e. dispenser unit) (col. 22, lines 1-14). Furthermore, a laser beam is scanned across the surface while a reactant gas (e.g. input gas) is introduced close to the intersection of the beam and the substrate, which is analogous to delivering a beam of electromagnetic radiation to produce a high flux of point of use generated reactive gas species that reacts with the surface (col. 3, lines 50-55).

DiMeo Jr. teaches a chemical vapor deposition method for forming a multi-component oxide layer wherein the first and second precursor reactant sources (i.e. input and process gases) are introduced into the chamber simultaneously (col. 4, lines 43-49).

Omstead discloses a method of uniform thin film deposition of a material on a substrate. Specifically, the substrate rests on a chuck that is located beneath a gas dispersion plate (i.e. dispenser) from which the process gas flows (col. 9, lines 1-7).

Therefore, it would be obvious to one skilled in the art at the time of the invention to adapt Sakuma's atomic layer epitaxy process by incorporating Elliott's relative motion

and electromagnetic radiation beam, DiMeo Jr.'s simultaneous introduction of process gases, and Omstead's dispenser unit location in order to obtain a time efficient method of successfully forming a monolayer by reducing the number of process steps and enhancing the reaction of the process gases with electromagnetic radiation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANCIS P. SMITH whose telephone number is (571)270-3717. The examiner can normally be reached on Monday through Friday 7:30 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mikhail Kornakov can be reached on (571)272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

FPS

/Michael Kornakov/
Supervisory Patent Examiner, Art Unit 4151